

# **LASER-CUT FRAME FOR EXERCISE MACHINE AND METHOD**

## **BACKGROUND OF THE INVENTION**

1. **Field of the Invention:** The present invention relates to exercise machines. More particularly, the present invention relates to exercise machines of the type including a plurality of tubular frame members extending longitudinally, transversely and vertically and upon which various devices are mounted including pistons, cylinders, rods, crank arms, levers and other devices. To that end, the present invention relates to an exercise machine which constitutes an improvement over the last mentioned description wherein the sides of the machine are made of flat laser-cut side plates or frame members which are connected together in spaced parallel relation with the devices, such as the pistons, etc, being mounted between or on the two frame members. The laser-cut flat frame members generally eliminate the need for having any horizontally extending, vertically extending and/or transversely extending tubular frame members.

2. **Prior Art:** A patentability search was conducted on the present invention and the following listed patents and references were uncovered in the search.

Weir	Pub. No. US 2003-0109364	Pub. Date June 12, 2003
Hughes	No. 4,798,414	January 17, 1989
Hatfield	No. 5,605,526	February 25, 1997
Tornabene	No. 6,544,151 B2	April 8, 2003
Casini	No. 6,367,874 B2	April 9, 2002
Gamble	No. 5,634,687	June 3, 1997
Johnson	No. 5,085,486	February 4, 1992
Birch	No. 4,367,870	January 11, 1983
Stinchfield	No. 4,109,960B1	July 26, 1994
Olsson	No. 3,879,083	April 22, 1975
Ware, Sr.	No. D441,553S	May 8, 2001
Watson et al	No. Des. 357,128	April 11, 1995
Fonville	No. Des. 327,180	June 23, 1992
Barlew No.	Des 521,321	March 13, 1979

With respect to the Weir publication, it might seem, at first blush, that Figure 6 of the drawing could be considered as relevant. However, it is believed that this is a mere incidental disclosure of a flat surface that is not used at all in the sense of the present invention. In Weir, the device itself is a box-like construction. Weir does not recognize the problem solved by the present invention: i.e. the rather clumsy appearance and structure of existing exercise machines and the desire of the present invention to simplify existing machines by preparing a pair of plates laser-cut from steel to form the sides of the exercise machine. Between the two plates of the device of the present invention, and at various locations, are the elements which form additional and necessary parts of the exercise device. This consideration was not dealt with anywhere in the Weir disclosure.

### **SUMMARY OF THE INVENTION**

The present invention provides a frame structure for an exercise machine. The frame structure consists essentially of a pair of vertically supported, horizontally extending parallel laser-cut plates. The laser-cut plates or side members are cut from a piece of 3/16 inch steel and are connected together in spaced parallel relation, about 7 inches apart. The space between the two plates is sufficient to provide room for elements of the exercise machine such as, levers, pistons, cylinders, crank arms, etc. When constructing an exercise machine in accordance with the present invention, a pair of identical side plates are spaced vertically in a predetermined spaced relationship. A plurality of braces, about 7" long with ends that fit into rectangular slots spaced about the peripheries of the side plates are inserted into the slots and the resulting sandwich structure is held by clamps, such as c-clamps, after which the ends of the braces are welded to the plates along with a plate for the seat and a plate for the book support. After the

two plates have been secured together by welding the ends of the braces plus the plates for the seat, back support, the c-clamps are removed. At this point, additional elements of the exercise machine are placed in the device between the two flat plates including, for example, pistons and cylinders, handles and rods, crank arms, etc. For the most part, horizontal tubular members, vertical tubular members and transverse tubular members such as are used in prior art exercise machines are eliminated thus providing a slick appearing exercising machine with two flat sides and the operating mechanisms being located between or on the two flat sides.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

Figure 1 is an elevation of one of the laser-cut side frames of the present invention.

Figure 2 is a perspective view of an exercise machine in its preliminary stages of construction utilizing two of the laser-cut side frames shown in Figure 1.

Figure 3 is a perspective view of a prior art exercise machine for which the laser-cut side frames of Figure 2 are designed to replace ultimately.

Figure 4 is a view similar to Figures 1 and 2 but showing, in dotted lines, the additional elements (pistons, arms and legs) needed to complete the illustration in Figure 2 to the equivalent of the prior art device in Figure 3.

Figure 5 is a perspective view of the new exercise machine shown in Figure 4.

Figure 6 is a side elevation of a second type of exercise machine constructed in accordance with the present invention utilizing laser-cut side frames;

Figure 7 is a perspective view of the prior art exercise machine which the construction of Figure 6 is designed to replace.

Figure 8 is an elevation of a brace used to hold the side plates together.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings in detail, Figure 3 shows an existing exercise machine **10** for which the laser-cut side members of the invention (later to be described) are designed. The exercise machine **10** in Figure 5 includes a back support **12**, a seat **14** and a foot rest **16**. Moveable handles **18** are mounted above the person (not shown) seated on the back support and seat and constitute a means for providing exercise for the shoulders and the muscle group including the deltoids, triceps, latissimus dorsi, and triceps. The manner in which the handles **18** provide exercise for the shoulders will be described in hereinafter. Sufficient to say, however, the elements just described are all mounted on a frame **20** which includes a horizontal tubular member **22**, a vertical tubular member **24** connected at the rear of the horizontal member **22** and a cross tubular member **26** mounted at the point of intersection of members **22** and **24** to serve as a stabilizing foot for the rear end of the machine. Finally, there is a rear frame cover **28** which extends from the vertical member **24** to the upper end of the back support **12**. Also shown in Figure 3 are a pair of cylinders **30** and **31** which operate in conjunction with the handles **18**, as will hereinafter appear, to provide the type of exercise desired.

One of the problems, or disadvantages, of the exercise machine **10** disclosed in Figure 3 is that it requires too many different frame members such as members **20**, **22**, **24** and **26** to be arranged and connected together so as to provide the frame for the machine itself.

The present invention involves the idea of making a pair of side frame members to replace most of the individual horizontal members, vertical members and cross members shown in Figure 5 so as to provide an esthetically superior appearance for the exercise machine. The

present invention provides a cheaper method of manufacture and an ease of assembly as well as saving in shipping costs.

The present invention involves a method of redesigning a pre-existing exercise machine of the type having a plurality of horizontally extending tubular members, vertically extending tubular members and transversely extending tubular members with various handles, levers, piston, cylinders, rods and crank arms mounted on the tubular members, which consists of first taking an overall look at the prior art machine to comprehend, in a three dimensional sense, the horizontal and vertical extent of the machine; then secondly, designing a two dimensional pattern (not shown as such, but the shape as frame members 32 and 34) for a side plate which would comprehend the three dimensional vertical and horizontal reaches of the prior art machine; thirdly, utilizing the pattern for cutting a second side frame member and having the identical peripheral shape as the first side frame member; fourthly, providing openings and/or holes in the two resulting frame members in opposition to each other; fifthly, providing braces of equal length to be received in the openings in the two plates when placed in spaced parallel relation; and welding the braces to the two plates along with any other desirable cross plates to provide a frame structure for an exercise machine; thereafter adding seats, back supports as required together with the necessary piston, cylinders and levers to construct an exercise machine operable in the same manner as the prior art machine.

The side frame member of the present invention is represented by side frame member **32** shown in Figure 1. This side member is laser-cut from a piece of 3/16 inch thick steel.

Figure 2 shows an isometric view which includes two of the side frame members **32** and **34** in spaced parallel relation. As will hereinafter appear, the various elements of the exercise machine **10** shown in Figure 3 are placed between and along the side frame member **32** and **34** to produce the exercise machine **11** shown in Figure 5 as a replacement for the exercise machine **10** shown in Figure 3. When the side frame members **32** and **34** are laser-cut from the 3/16 inch thick steel plate, relief openings **36** and **38** are provided, where necessary, to cut down on the weight. Also, various holes and slots are automatically cut into the frame members **32** and **34** at places where cross braces can be inserted and where various bolts are employed to hook on pieces that would normally be mounted on the frame shown in the prior art machine of Figure 3. Figure 8 is an elevation of a brace **122** which is cut from the same 3/16 inch steel stock as the sides **32** and **34**. Brace **122** is 7 3/8 inches long with 1 inch wide tabs on the ends. The brace itself is 3 inches wide for the 7 inch extent between the tabs.

In any event, the technique for building a piece of exercise equipment will be drastically modified by the present invention because it will merely involve the cutting of plates **32** and **34** from 3/16 inch steel and will eliminate the need, for example, for horizontal member **22**, vertical member **24** and the right angle leg **26** shown in Figure 3. The plates **32** and **34** in Fig. 4 are held in spaced relation by inserting the tabs or ends **124** of braces, such as brace **122**, into the rectangular slots **126** located about the peripheries of the plates. The ends of the braces are then welded to the plates. After the ends of the

braces 122 and flat cross members 44, 46, 48 and 50 (shown in Fig. 2) are welded into place, the-clamps can be removed and the frame structure consisting of the side members 32 and 34 will hold in a flat condition after which various pistons, cylinders and levers etc can be mounted between the two plates 32 and 34.

In the aforementioned description, the cross members 44 and 46 in Fig 2 are narrow plates (or braces) of flat steel that serve as a backing for the back support 12 (not shown in this figure) whereas the cross member 50 is another piece of flat steel which serves as a support for the seat 14 (not shown in this figure). The forward cross member 48 is also a piece of flat steel which serves as a foot rest itself or a support for a wider foot rest which is actually shown in Figure 5.

Before commencing with the foregoing procedure which involves the connecting of the two plates 32 and 34 together, it may be desirable to clamp one of the plates to a flat surface or to otherwise flatten the same as a result of incidental warping that might have occurred during the laser cutting operation. To this end one of the plates, such as plate 34 can be clamped to a flat table, the braces inserted into this flat plate 34 and the plate 32 connected onto the projecting ends of the braces 122. The remainder of the connecting procedures as described above, will remain the same except that the plates 32 and 34 are now horizontal in this variation of procedure. After removing the C-clamps which hold the two plates together, the plate 34 will then be unclamped from the flat table. A second way of compensating for any warping that might occur during the laser-cutting operation would be to take an essentially horizontal straight edge and clamp it to plate 34, for example, and then clamp a vertical straight edge (not shown) to a vertical portion of the plate 34 and then continue with the connecting procedure as described

above. After removing the c-clamps which hold the two plates together, it is then only necessary to remove the two straight edges and the clamp that hold them to the plate **34**

In Figure 4, which represents the exercise machine for the deltoids, triceps, latissimus dorsi and triceps muscles, the laser-cut frame member **32** is connected to and mounted over the side member **34** (not shown in this view). Between the side members are mounted the pistons (cylinders) which are necessary for the operation of this machine. The handle **18** can be raised and lowered by the operator who rests on the back support **12** and the seat **14**. The remote end of the handle **18** is connected to a horizontal shaft **54** which is connected to a rocker arm **56** (partly shown in dotted lines). The left hand end of the rocker arm **56** is provided with a pivot end **58** (shown in dotted lines) which is held by a pin that extends through holes in the side members **32** and **34** as desired. The right hand end of the rocker arm **56** is connected at **60** to an elongated rod **62**. The lower end of the elongated rod **62** is connected to the right hand end of a second rocker arm **63** which is pivoted at a convenient point or location which can be varied depending upon the preferences of the operator. A pair of piston rods **64** and **66** extend upwardly from the pistons **30** and **31**, respectively, and connect at their upper ends pivotally to the second rocker arm **63**. Thus, when the handle **18** is elevated the rocker arm **56** moves to lift the elongated rod **62** turning the second rocker arm **63** in a counter-clockwise direction lifting up on the piston rods **66** and pushing downwardly on the piston rod **64**. The pivot point for the rocker arm **63** can be adjusted to increase or decrease the effort required to lift the handle **18**. When the handle **18** is pulled downwardly a different set of muscles or different sets of muscles come in to play and the movement of the pistons **30** and **31** are reversed.



Figure 5 is a perspective of the elements shown in Figure 5 and represent an attractive appearing exercising machine as opposed to the machine shown in Figure 3. A horizontal tubular member **52** is attached transversely to the lower left hand end of the frame structure to provide lateral stability for the machine **11**.

Figure 6 represents a different type of machine from that shown in Figures 1 through 5 but it represents a machine which is constructed using the same principles as illustrated in Figures 1, 2, 4 and 5 in that the machine **15** is constructed from a pair of spaced parallel plates **68** and **70** (the latter not appearing in Figure 6 because it is behind the front plate **68**). The plate **68** is provided (as is the case with plate **70**) with relief openings **72**, **74**, **76** and **78** in an essentially arbitrary manner as is the case with respect to the relief holes **36** and **38** shown in Figure 2. The exact shape and size and number of these relief openings can be determined by trial and error as they are merely provided to cut down on the weight of the plates without causing any loss in strength. The exercise machine **15** shown in Figure 6 represents the replacement for the exercise machine **13** shown in Figure 7, the latter being the prior art exercise machine for exercising the legs, the quadriceps and the hamstring muscles.

In Figure 6, the leg machine **15** is shown as being provided with a pair of forward rollers **80** and a pair of spaced rear rollers **82**. The rollers **80** and **82** are rotatably mounted on the ends of shafts that pass through the rollers and which also pass through a horizontal support member **84** which, in turn, is connected to a vertical leg **86**. The upper end of the leg **86** is pivotally attached to a bracket **88** and an elongated rod **90** is pivotally connected to the vertical leg **86** below and adjacent to the bracket **88**. The other end of the elongated rod **90** is pivotally connected to the right hand end of a rocker arm **92**. The

rocker arm **92** is pivotally connected to a piston rod **96** adjacently a lower portion of the rocker arm whereas the upper end of the rocker arm **92** is pivotally connected to a second piston rod **98**. The rocker arm **92** is itself pivotal around an axis which is located between the points of attachment of the piston rods **96** to **98**. Piston rods **96** and **98** connect with pistons (cylinders) **100** and **102**, respectively. To operate the machine of Figures 6 and 7, the operator sits on the seat **14** with his or her back being supported by the back support **12** and then places his or her ankles between the rolls **80** and **82**; by swinging the legs forward or back, the vertical leg **86** is pivoted around its upper end causing the elongated rod **90** to move back and forth causing the rocker arm **92** to move back and forth around its pivot point causing the pistons **100** and **102** to be alternately compressed and expanded.

In the prior art exercise machine **13** of Figure 7, the back support **12** rests against the upper ends of a pair of elongated tubular structural members **104** and **106**. The seat rests upon a horizontal structural member **108**. The horizontal support **112** connects with a second horizontal support **114** which is disposed at right angles thereto. At the point where the two horizontal supports **112** and **114** come together a vertical support **116** is provided. The vertical support **116** is located behind the back support **12**. The pistons **100** and **102** are connected to vertical member **116** and also forwardly to the rocker arm **92** (not clearly shown in this Figure).

A comparison of Figures 6 and 7 will show that the flat side structure of Figure 6 creates an esthetically better appearance than the exercise machine shown in Figure 7.

Despite the superior appearances of the two different exercise machines shown in Figures 5 and 6, a more important advantage is achieved by being able to provide an

exercise machine constructed of a pair of laser-cut side frame members which permit the interposition of the various elements, such as pistons, etc., to provide a complete and operating exercise machine.

Although the present invention discusses two specifically different exercise machines such as shown in Figures 4 and 6 represented by the creation of the machines starting with flat side plates **32** and **68** respectively, there are features of plates **32** and **68** that have common attributes. For example, each plate has an upper end **A** which serves to provide the portion of the plate for holding the back support **12**. Also, the lower left hand end of each plate **32** or **68** is provided with "heel" portion **B**. Again, each plate is provided with a right hand projecting portion **C** intermediate the right hand edge of the plate for the purpose of supporting the seat **14**. Finally, each plate **32** or **68** is provided with a lower base portion **D** which extends horizontally from the "heel" portion **B**. In the case of the device shown in Figure 4, the portion **D** extends into a foot rest whereas the machine of Figure 6 does not have a foot rest.

Whereas the present invention has been described in particular relation to the drawings attached hereto, it should be understood that other and further modification can be made within the spirit and scope of this invention.